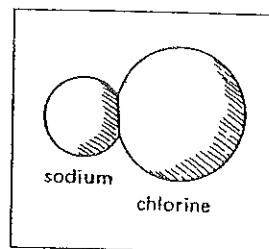


LESSON 18 | What is a chemical formula?

Each element has its own chemical symbol. Each compound has its own chemical formula. A formula tells us two important things about a compound. It tells us what elements the compound is made of. It also tells us how many atoms of each element are in a molecule of the compound.

The formula for table salt is NaCl.

- Na is the symbol for sodium.
- Cl is the symbol for chlorine.

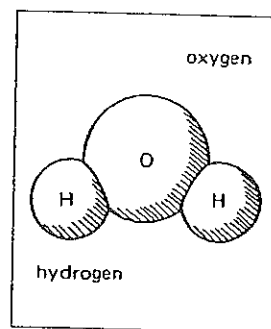


One molecule of NaCl has a total of two atoms. One of the atoms is sodium (Na). The other atom is chlorine (Cl).

Sometimes a symbol has a small number written next to it. This number tells us the number of atoms there are of that element.

The formula for water is H₂O.

- H is the symbol for hydrogen.
- O is the symbol for oxygen.
- H₂ means two atoms of hydrogen.
- O means one atom of oxygen.



One molecule of H₂O, then, has a total of three atoms. Two of the atoms are hydrogen. One atom is oxygen.

The formula for a compound is always the same. A change in the formula means that a new substance was formed.

It is helpful to learn to recognize some chemical symbols. However, if you see one you do not know, you can always look it up in a dictionary, an encyclopedia, or a chemistry book.

SOME COMMON MOLECULES

Formula: HgO

Name: mercuric oxide

Elements: mercury (Hg) and oxygen (O)

Number of atoms in each element:
1 atom of mercury (Hg)
1 atom of oxygen (O)

Total number of atoms in one molecule:
2 atoms total

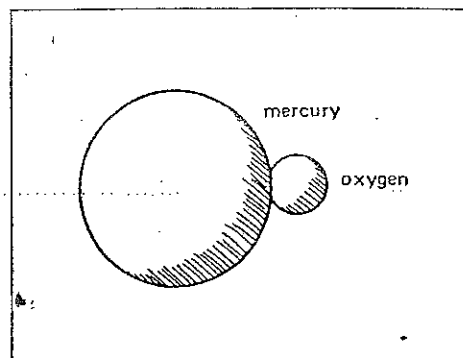


Figure A

Formula: KCl

Name: potassium chloride

Elements: potassium (K) and chlorine (Cl)

Number of atoms in each element:
1 atom of potassium (K)
1 atom of Chlorine (Cl)

Total number of atoms in one molecule:
2 atoms total

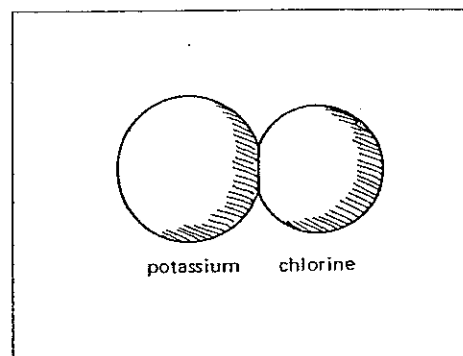


Figure B

Formula: NaOH

Name: sodium hydroxide (lye)

Elements: sodium (S), oxygen (O), and hydrogen (H)

Number of atoms in each element:
1 atom of sodium (S)
1 atom of oxygen (O)
1 atom of hydrogen (H)

Total number of atoms in one molecule:
3 atoms total

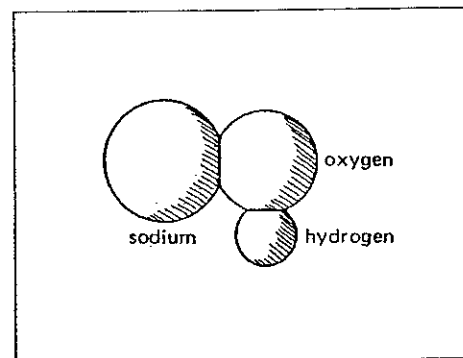


Figure C

MORE COMMON MOLECULES

Formula: Fe_2O_3

Name: iron oxide (rust)

Elements: iron (Fe) and oxygen (O)

Number of atoms in each element:

2 atoms of iron (Fe)

3 atoms of oxygen (O)

Total number of atoms in one molecule:

5 atoms total

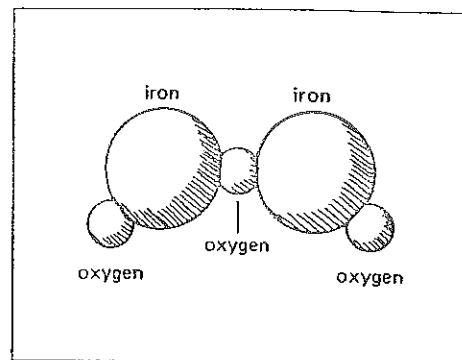


Figure D

Formula: H_2SO_4

Name: sulfuric acid

Elements: hydrogen (H), sulfur (S), and oxygen (O)

Number of atoms in each element:

2 atoms of hydrogen (H)

1 atom of sulfur (S)

4 atoms of oxygen (O)

Total number of atoms in one molecule:

7 atoms total

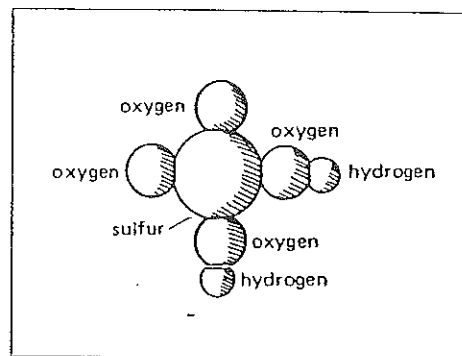


Figure E

Formula: NaHCO_3

Name: sodium hydrogen carbonate (baking soda)

Elements: sodium (Na), hydrogen (H), carbon (C), and oxygen (O)

Number of atoms in each element:

1 atom of sodium (Na)

1 atom of hydrogen (H)

1 atom of carbon (C)

3 atoms of oxygen (O)

Total number of atoms in one molecule:

6 atoms total

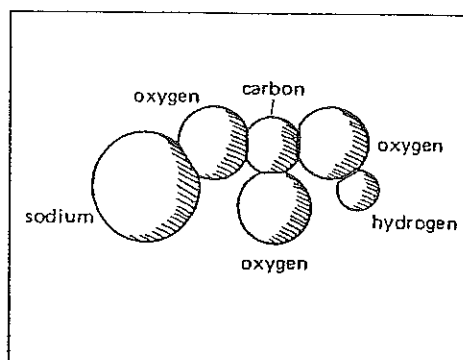


Figure F

COMPLETING SENTENCES

Choose the correct word or term for each statement. Write your choice in the spaces provided.

1. A molecule is made up of _____
atoms, oxygen
2. A single molecule has at least _____ atoms.
one, two
3. _____ are combined to make _____.
Elements, Compounds elements, compounds
4. There are _____ elements than compounds.
more, fewer
5. Molecules are usually _____ than atoms.
larger, smaller

The formula for starch is $C_6H_{10}O_5$. This stands for one molecule of starch. Answer these questions about the starch molecule.

6. Starch is made up of _____ elements.
one, two, three
7. The number of different kinds of atoms in starch is _____.
three, billions
8. One molecule of starch has _____ atoms of hydrogen.
two, six, ten
9. The total number of atoms in one molecule of starch is _____.
6, 10, 16, 21
10. The number of molecules in a teaspoon of starch is _____.
about one hundred, more than a billion

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A	Column B
_____ 1. CaF_2	a) contains one kind of atom
_____ 2. HF	b) 3 atoms in each molecule
_____ 3. formula	c) 2 atoms in each molecule
_____ 4. element	d) short way of writing an element
_____ 5. symbol	e) short way of writing a compound

COMPLETE THE CHART

Complete the chart by filling in the missing information. The first one has been done for you.

Formula	Name	Number of Elements	Names of the Elements	Number of Atoms of Each Element	Total Number of Atoms In One Molecule
1. MgO	magnesium oxide	2	magnesium oxygen	1 1	2
2. SO ₂	sulfur dioxide				
3. NH ₃	ammonia				
4. H ₂ CO ₃	carbonic acid (soda water)				
5. C ₁₂ H ₂₂ O ₁₁	table sugar				
6. MgSO ₄	Epsom salts				
7. NaOH	sodium hydroxide (lye)				
8. H ₂ O ₂	hydrogen peroxide				
9. Fe ₂ O ₃	iron oxide (rust)				
10. NaHCO ₃	sodium bicarbonate (baking soda)				

